TEST PROCEDURES
for
HIGH LEVEL ARCHITECTURE
OBJECT MODEL TEMPLATE

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VERSION 1.3
DRAFT

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TABLE OF CONTENTS

1. OVERVIEW

This document contains test procedures for the High Level Architecture Object Model Template (OMT), v1.3. [1]

1.1 DEFINITIONS

The following definitions apply through this document:

DDM	Data Distribution Management
DM	Declaration Management
HLA	High Level Architecture
FOM	Federation Object Model
FUT	Federate or Federation Under Test
OMDT	Object Model Development Tool
OMT	Object Model Template
SOM	Simulation Object Model

1.2 ORGANIZATION OF TEST PROCEDURES

The OMT test procedures define the tables that are required for both Simulation Object Models (SOMs) and Federation Object Models (FOMs), and in some instances, the allowed set of information which can be used to populate those tables. For each table, the parameters are specified as one of three values: user specified, reference to a section in these test procedures, or a specific value. Additionally, some parameters are specified as optional. This indicates that the parameter can be optionally specified in the table.

1.3 TEST METHODS

OMT Conformance Testing is done within the automated Object Model Development Tool (OMDT) used to create SOMs and FOMs. The OMDT recognizes that an invalid object model may exist in intermediate stages of creation, so it allows the user to work with invalid or incomplete object models. The tool incorporates a user-invoked Consistency Checker that can be used to verify that a model is valid at any time during its development. All of the OMT Test Procedures listed in this document are supported by the Consistency Checker in the OMDT v1.3.

2. OBJECT MODEL IDENTIFICATION

An HLA object model must include a minimum but sufficient degree of meta-level information in the object model description to facilitate object model reuse. Although it may be appropriate in some instances to associate a wider range of meta-level information with an object model, it is always necessary to include certain key identifying information within the model itself. The Object Model Identification Table is required for all object models.

2.1 TRACEABILITY

Section 4.1 Object model identification table [1]

2.2 SOM TESTING

The FUT shall have an OMT entry containing the following information for each SOM:

Name:	user specified
Version	user specified
Modification Date	user specified
Purpose	user specified
Application Domain	user specified
Sponsor	user specified
POC	user specified
POC Organization	user specified
POC Telephone	user specified
POC Email	user specified

2.3 FOM TESTING

The FUT shall have an OMT entry containing the following information for each FOM:

Name:	user specified
Version	user specified
Modification Date	user specified
Purpose	user specified
Application Domain	user specified
Sponsor	user specified
POC	user specified
POC Organization	user specified
POC Telephone	user specified
POC Email	user specified

3. CLASS STRUCTURES

A HLA object model class describes a collection of objects with some properties, behavior, relationships, and semantics in common. A class hierarchy for a HLA object model is a structure of class-subclass relations between classes of objects from the simulation or federation domain.

3.1 TRACEABILITY

Section 4.2 Object class structure table [1]

3.2 SOM TESTING

The FUT shall have an OMT entry containing the following information for each object class or subclass:

Object Class Name:	user specified
Publishable/Subscribable:	P, S, PS, N (in parentheses)

All class-subclass relationships between object classes shall be documented via the Object Class Structure Table.

All object class names shall be uniquely identifiable in an HLA object model when concatenated via dot notation with the names of higher level superclasses.

All object class and subclass names shall conform to the OMT DIF specification [REF 1, Section E.1.3].

Any object class shall have at most one superclass.

Any object class referenced in any other component (table) of a HLA SOM shall be included in the Object Class Structure Table.

3.3 FOM TESTING

The FUT shall have an OMT entry containing the following information for each object class or subclass:

Object Class Name:	user specified
Publishable/Subscribable:	S, PS, N (in parentheses)

All class-subclass relationships between object classes shall be documented via the Object Class Structure Table.

All object class names shall be uniquely identifiable in an HLA object model when concatenated via dot notation with the names of higher level superclasses.

All object class and subclass names shall conform to the OMT DIF specification [REF 1, Section E.1.3].

Any object class shall have at most one superclass.

Any object class referenced in any other component (table) of a HLA FOM shall be included in the Object Class Structure Table.

4. OBJECT INTERACTIONS

An interaction is an explicit action taken by an object, that can optionally be directed toward another object, geographical area, etc. Interactions are specified in the object interaction table of HLA object models in terms of the hierarchical interaction structure.

4.1 TRACEABILITY

Section 4.3 interaction class structure table [1]

4.2 SOM TESTING

The FUT shall have an OMT entry containing the following information for each interaction class or subclass:

Interaction Class Name:	user specified
Init/Sense/React:	I, S, R, IS, IR, N

All class-subclass relationships between interaction classes shall be documented via the Interaction Class Structure Table.

All interaction class names shall be globally unique when concatenated via dot notation with the names of higher-level superclasses.

All interaction class and subclass names shall conform to the OMT DIF specification [REF 1, Section E.1.3].

Any interaction class shall have at most one superclass.

4.3 FOM TESTING

The FUT shall have an OMT entry containing the following information for each interaction class or subclass:

Interaction Class Name:	user specified
Init/Sense/React:	S, R, IS, IR, N

All class-subclass relationships between interaction classes shall be documented via the Object Interaction Table.

All interaction class names shall be globally unique when concatenated via dot notation with the names of higher-level superclasses.

All interaction class and subclass names shall conform to the OMT DIF specification [REF 1, Section E.1.3].

Any interaction class shall have at most one superclass.

5. ATTRIBUTES

Each class of simulation domain objects is characterized by a fixed set of attribute types. These attributes are named portions of their object's state whose values can change over time. An HLA object model shall document all such object attributes in the attribute table.

5.1 TRACEABILITY

Section 4.4 Attribute table [1]

5.2 SOM TESTING

The FUT shall have an OMT entry containing the following information for each object attribute specified:

Object Class Name:	selected from table in section 3.2
Attribute Name:	user specified
Datatype:	base attribute type or user defined
Cardinality:	user specified
Units:	user specified or N/A
Resolution:	user specified or N/A
Accuracy:	user specified
Accuracy Condition:	user specified or N/A (Accuracy = perfect -> Accur Cond = always)
Update Type:	static, periodic, conditional or N/A
Update Rate/Condition:	user specified or N/A
Transferable/Acceptable:	T, A, TA, N
Updateable/Reflectable:	U, R, UR
Routing Space	N/A

If the specified datatype is user defined, the identifier shall be included and characterized in either the Enumerated Datatype Table or the Complex Datatype Table.

If the specified datatype is user defined, the entry for "Units", "Resolution", "Accuracy Condition" shall be "N/A".

5.3 FOM TESTING

The FUT shall have an OMT entry containing the following information for each object attribute specified:

Object Class Name:	selected from table in section 3.3

Attribute Name:	user specified
Datatype:	base attribute type or user defined
Cardinality:	user specified
Units:	user specified or N/A
Resolution:	user specified or N/A
Accuracy:	user specified
Accuracy Condition:	user specified or N/A (Accuracy = perfect -> Accur Cond = always)
Update Type:	static, periodic, conditional or N/A
Update Condition:	user specified or N/A
Transferable/Acceptable:	TA, N
Updateable/Reflectable:	UR
Routing Space:	user specified or N/A

If the specified datatype is user defined, the identifier shall be included and characterized in either the Enumerated Datatype Table or the Complex Datatype Table.

If the specified datatype is user defined, the entry for “Units”, “Resolution”, “Accuracy Condition” shall be “N/A”.

6. PARAMETERS

Interaction parameters shall be used to associate relevant and useful information with classes of interactions. Parameters provide the information required for recipients of interactions to calculate the appropriate effects of that interaction. While some subscribers of interactions may not require all associated parameters, others will need the full set of parameter-specified information to support calculation of new attribute values for objects affected by the interaction. For every interaction class, the full set of parameters associated with that interaction class shall be described in the parameter table.

6.1 TRACEABILITY

Section 4.5 Parameter table [1]

6.2 SOM TESTING

The FUT shall have an OMT entry containing the following information for each parameter specified:

Interaction Class Name:	selected from table in section 4.2
Parameter Name:	user specified
Datatype:	base attribute/parameter type or user defined
Cardinality:	user specified
Units:	user specified or N/A
Resolution:	user specified or N/A
Accuracy:	user specified

Accuracy Condition:	user specified or N/A (Accuracy = perfect -> Accur Cond = always)
Routing Space:	N/A

All of the parameters associated with each interaction class shall be included in the Parameter Table.

If the specified datatype is user defined, the identifier shall be included and characterized in either the Enumerated Datatype Table or the Complex Datatype Table.

If the specified datatype is user defined, the entry for “Units”, “Resolution”, “Accuracy Condition” shall be “N/A”.

6.3 FOM TESTING

The FUT shall have an OMT entry containing the following information for each parameter specified:

Interaction Class Name:	selected from table in section 4.3
Parameter Name:	user specified
Datatype:	base attribute/parameter type or user defined
Cardinality:	user specified
Units:	user specified or N/A
Resolution:	user specified or N/A
Accuracy:	user specified
Accuracy Condition:	user specified or N/A (Accuracy = perfect -> Accur Cond = always)
Routing Space:	user specified or N/A

If the specified datatype is user defined, the identifier shall be included and characterized in either the Enumerated Datatype Table or the Complex Datatype Table.

If the specified datatype is user defined, the entry for “Units”, “Resolution”, “Accuracy Condition” shall be “N/A”.

7. ATTRIBUTE TABLE/PARAMETER TABLE SUBCOMPONENTS

While both the attribute table and the parameter table provide columns for datatype specifications, they do not provide comprehensive guidance for specifying complex datatypes. Additional table formats are provided as Attribute table/Parameter table subcomponents to document the structure and content of enumerated datatypes and complex datatypes. These tables shall be used for situations ins which a federate or federation implements the attribute or parameter datatypes for which the tables are designed.

7.1 TRACEABILITY

Section 4.6 Attribute table/parameter table subcomponents [1]

7.2 ENUMERATED DATATYPE TABLE

7.2.1 SOM Testing

The FUT shall have an OMT entry containing the following information for each enumerated datatype:

Identifier:	user defined datatype from section 5.2 or 6.2
Enumerator:	user specified
Representation:	user specified

7.2.2 FOM Testing

The FUT shall have an OMT entry containing the following information for each enumerated datatype:

Identifier:	user defined datatype from section 5.3 or 6.3
Enumerator:	user specified
Representation:	user specified

7.3 COMPLEX DATATYPE TABLE

7.3.1 SOM Testing

The FUT shall have an OMT entry containing the following information for each complex datatype specified:

Complex Datatype Identifier:	user defined datatype from section 5.2 or 6.2
Field Name:	user specified
Datatype:	base attribute/parameter datatype or user defined
Cardinality:	user specified
Units:	user specified or N/A
Resolution:	user specified or N/A
Accuracy:	user specified or N/A
Accuracy Condition:	user specified or N/A (Accuracy = perfect -> Accur Cond = always)

If the datatype for a field is user defined, the entry for “Units”, “Resolution”, “Accuracy”, and “Accuracy Condition” shall be “N/A”.

7.3.2 FOM Testing

The FUT shall have an OMT entry containing the following information for each complex datatype specified:

Complex Datatype Identifier:	user defined datatype from section 5.3 or 6.3
Field Name:	user specified
Datatype:	base attribute/parameter datatype or user defined
Cardinality:	user specified
Units:	user specified or N/A
Resolution:	user specified or N/A
Accuracy:	user specified or N/A
Accuracy Condition:	user specified or N/A (Accuracy = perfect -> Accur Cond = always)

If the datatype for a field is user defined, the entry for “Units”, “Resolution”, “Accuracy”, and “Accuracy Condition” shall be “N/A”.

8. ROUTING SPACES

Routing spaces are a fundamental concept of Data Distribution Management (DDM), the reduction of the volume of data delivered to federates, based on user specified constraints. A routing space is a multidimensional coordinate system through which federates either express an interest in receiving data or declare their intention to send data. The routing space table records all the elements necessary to fully specify the common set of routing space specifications among federates.

8.1 TRACEABILITY

Section 4.7 Routing space table [1]

8.2 SOM TESTING

The routing space concept is the formalization of a federation agreement and is not tested at the single federate level.

8.3 FOM TESTING

The FUT shall have an OMT entry containing the following information for each routing space used in the federation:

Routing Space:	user specified
Dimension:	user specified
Dimension Type:	basetype or user-defined datatype
Dimension Range/Set:	user specified

Range/Set Units:	user specified or N/A
Normalization Function:	user specified

9. LEXICON

In addition to the specification of which particular classes of data will be exchanged among the members of a HLA federation to meet a given set of federation requirements, it is also imperative that the federates achieve a common understanding of the semantics of the data being exchanged if interoperability between simulations is to be attained. The Lexicon provides a means for federations to document the definitions of all terms utilized during construction of FOMs, and for individual federates to document the definitions of all terms provided in their SOMs.

9.1 TRACEABILITY

Section 5. SOM/FOM Lexicon [1]

9.2 SOM TESTING

The FUT shall have an OMT entry containing the following information from each Object Class, Interaction Class, Attribute, Parameter, Enumerated Datatype, and Complex Datatype:

Term:	defined in sections 3.2, 4.2, 5.2, 6.2, 7.2.1 or 7.3.1
Definition:	user specified

9.3 FOM TESTING

The FUT shall have an OMT entry containing the following information from each Object Class, Interaction Class, Attribute, Parameter, Enumerated Datatype, Complex Datatype and Routing Space:

Term:	defined in sections 3.3, 4.3, 5.3, 6.3, 7.2.2, 7.3.2, or 8.3
Definition:	user specified

10. REFERENCES

[1] DMSO, High Level Architecture Object Model Template, v1.3, 5 February 1998.